Title	Achievement motivation for band: A cross-cultural examination of the 2 × 2 achievement goal motivation framework
Author(s)	Peter Miksza, Leonard Tan and Christopher Dye
Source	*Psychology of Music, 44*(6), 1372–1388
Published by	SAGE Publications

Achievement motivation for band: A cross-cultural examination of the 2 × 2 achievement

goal motivation framework

Peter Miksza

Leonard Tan

Christopher Dye

Abstract

The purpose of this study was to explore the achievement goal motivation orientations of instrumental music students in the US and Singapore. Participants in this study were volunteer band students ($N = 359$) from eight American public high schools ($n = 217$) and five polytechnics in Singapore ($n = 142$). Data were collected via a questionnaire that included measures of (a) the 2 X 2 achievement goal orientation constructs (mastery approach, mastery avoid, performance approach, and performance avoid), (b) flow in band rehearsal, (c) grit in practicing, and (d) commitment to band. In contrast to previous research on the 2 X 2 achievement goal framework in music, sports, and academics, exploratory factor analyses of the achievement goal questionnaire items yielded a three-factor structure indicating latent constructs of mastery-approach, mastery-avoid, and performance goal orientations. In contrast to previous research comparing achievement goals of learners from collectivistic and individualistic cultures, no significant differences in achievement goal sub-scale means were found as a function of culture. However, some differentiated patterns of relationship were found between the achievement goal sub-scales and flow, grit, and commitment to band as a function of culture.

Determining how motivational dispositions can impact a developing musician's engagement and persistence in learning has been established as an important challenge for music researchers to undertake (e.g., Asmus, 1994; Hallam, 2002; Linnenbrink-Garcia, Maehr, & Pintrich, 2011). Exploring whether and how variations among students' motivational orientations can be predictive of their dedication to learning and their perceived value of the music learning experience can yield insights relevant to extending theoretical models of music learning and informing practical issues of instructional climate and design. Achievement goal motivation theories have emerged as prominent frameworks for investigating the purposes and reasons that lead students to strive for competence when engaged in learning (Elliot, 2005; Schunk, Meece, & Pintrich, 2014).

Recent scholarship in achievement goal theory has focused on learners' personal definitions of competence and their motives to pursue competence (Elliot, 1999; 2005). Elliot and McGregor (2001) proposed a 2 X 2 achievement goal orientation framework that highlights learners' tendencies to define competence in terms of a self-referential standard (i.e., mastery-oriented) or in comparison to others (i.e., performance-oriented). They also asserted that each orientation can be valenced in regard to whether a learner is motivated to pursue a potentially positive outcome (i.e., approach-oriented) or avoid a potentially negative outcome (i.e., avoid-oriented). Thus, the 2 X 2 achievement goal framework specifies four goal orientations that can each be examined in relation to learning processes and outcomes. Mastery-approach goal orientations pertain to learners' tendencies to strive for competence in order to demonstrate personal improvement and satisfaction, whereas mastery-avoid orientations involve trying to avoid demonstrations of a loss of ability in comparison to previously established personal criteria or avoiding displays of misunderstanding. In contrast, performance-approach orientations are

those in which a learner strives for competence in order to demonstrate success as compared to the performance of others, whereas learners demonstrating performance-avoid orientations strive to avoid appearing incompetent with reference to others.

Much work has been devoted to investigating the 2 X 2 achievement goal framework in academic and sport contexts within Western cultural settings. Many researchers have examined whether the four goal orientation constructs hypothesized in the 2 X 2 model could be empirically identified and whether they could explain learners' achievement motivation dispositions better than previously established dichotomous (e.g., mastery/performance or approach/avoid) and trichotomous models (mastery/performance-approach/performance-avoid) (e.g., Conroy, Elliot, & Hofer, 2003; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Finney, Pieper, & Barron, 2004). In all cases cited above, the 2 X 2 model was shown to be the best comparative fit to the data collected. Researchers have also demonstrated the predictive utility of the 2 X 2 achievement goal model in academic contexts (e.g., Harackiewicz, Barron, Pintrich, Elliot, & Thrasher, 2002; Linnenbrink-Garcia, Maehr, & Pintrich, 2011; Moeller & Elliot, 2006). Typically, mastery-approach goals have been found to relate to deeper learning processes, help seeking, and persistence in the face of difficulty. However, relations between achievement outcomes and performance-approach and performance-avoid goal orientations tend to be mixed and little is known about correlates of mastery-avoid orientations.

Several researchers have explored the applicability of the 2 X 2 achievement goal framework in non-Western academic and sports contexts (e.g., Wang, Biddle, & Elliot, 2007; Wang, Lim, Lim, Aplin, Chia, McNeill, & Tan, 2008; Liu, Wang, Tan, Ee, & Koh, 2009). Although the general finding has been that the framework provides a good fit to the data on motivational dispositions, research with non-Western subjects seems to contradict some general

assumptions about the model. In the Western literature, mastery is the orientation typically associated with positive outcomes and characteristics, and performance orientations are associated with negative outcomes (e.g., Dweck 1986; Nicholls, 1989). However, research with Asian participants has found the adoption of both performance and mastery goals to be ideal (e.g., Wang et al., 2007; Wang et al., 2008). In addition, while approach goals are typically linked with positive outcomes and characteristics and avoidance goals are commonly associated with negative outcomes and characteristics (e.g., Cury, Elliot, Da Fonseca, & Moller, 2006; Elliot, 1997), studies with Asian participants suggest that an optimal motivational profile may be the simultaneous adoption of both approach and avoidance goals (e.g., Wang et al., 2007; Wang et al., 2008). The fact that the subjects were from collectivistic Asian cultures rather than individualistic Western societies may help explain the findings (Liu et al., 2009). Researchers have found that although people from collectivistic cultures have a greater tendency towards avoidance goals, such orientations are not associated with negative outcomes the way they have been for subjects from individualistic societies (e.g., Elliot, Chirkov, Kim, & Sheldon, 2001). These contrasting findings may reflect the fact that avoidance goals match the cultural norm of people within collectivistic cultures who more typically value avoidance for the sake of avoiding group discord (Heine, Lehman, Markus, & Kitayama, 1999; Liu et al., 2009). More empirical work is needed to investigate how culture may account for differences in achievement goals (King & McInerney, 2014; Zusho & Clayton, 2011).

Achievement goals in music research

Several researchers have examined how achievement goal motivation constructs might be related to performance achievement, learning strategies, and perceptions of educational climate within music learning contexts. Lacaille, Whipple, and Koestner (2005) asked musicians and

swimmers to recall a "peak" and "catastrophic" performing event from their past and to recall what their goals were leading up to the events using rating scales representing mastery, performance-approach, and performance-avoid constructs. Both groups recalled a mastery orientation being more prominent prior to the peak performance in comparison to the catastrophic performance. However, musicians recalled having stronger performance-approach and –avoid orientations than swimmers prior to the catastrophic performance suggesting that musicians may respond more negatively to performance goal orientations than athletes. In a follow-up study, Lacaille, Koestner, and Gaudreau (2007) examined the relationships between musicians', actors' and dancers' achievement goal orientations, self-rated performance achievement, performance anxiety, life satisfaction, and intentions to quit. In contrast to their earlier work, no differences were found in goal orientations as a function of artistic domain. Performance-approach orientations were positively related to reports of performance anxiety and performance-avoid orientations were positively related to reported intentions to quit.

The results of research investigating links between achievement goals and music performance achievement are somewhat mixed. Schmidt (2005) and Miksza (2009a) found significant positive relationships between secondary band students' reports of mastery goal orientations and measures of performance achievement. In contrast, both Miksza (2011) and Nielsen (2008) failed to find significant differences in performance achievement as a function of goal orientations when studying collegiate musicians. Findings relating goal orientations and music practice behavior tend to be clearer. Secondary and collegiate musicians who report greater mastery orientations tend to also demonstrate strategic practice behaviors more frequently, whereas those who report greater performance orientations tend to use strategic behaviors less (Miksza, 2009a, 2011; Nielsen, 2008; Smith, 2005). However, Miksza (2009b)

reported small positive correlations between mastery- and performance-approach scales and secondary students' self-reported practice habits (e.g., time spent practicing per day, estimated daily practice efficiency).

Matthews and Kitsantis (2007) explored whether high school band students' perceptions of group cohesion, collective efficacy, and motivational climate (i.e., mastery- vs. performance-oriented) would be predictive of perceptions of conductor support. Their findings suggested that those who tended to perceive more of a mastery-oriented class environment reported more group cohesion and greater collective efficacy and also believed their conductors to be more supportive of their learning. Matthews and Kitsantis (2013) also examined the relative effects of mastery- and performance-oriented rehearsal climates by randomly assigning students to rehearsal conditions in which a conductor focused feedback on either students' effort, hard work, focus on challenge, etc. (i.e., mastery climate) or achievement compared to others (i.e., performance climate). Participants in the mastery climate reported a greater sense of collective efficacy and self-efficacy although no differences in performance achievement were evident.

Given the typical adaptive and maladaptive learning patterns found in relation to achievement goals and the evidence cited above, it would be reasonable to expect relationships between achievement goal orientations and other constructs representative of important dispositions in music learning such as grit, flow, and commitment to music instruction. Grit has been described as a domain-general trait that embodies "perseverance and passion for long-term goals" (Duckworth, Peterson, Matthews, & Kelley, 2007, p. 1087). It has been shown to be predictive of a variety of important educational and career-related outcomes and dispositions (Duckworth & Quinn, 2009) and is an important quality for musicians to exhibit as they deal with failure, adversity, and variable rates of progress throughout their development. In the only

known study of grit in a music education context, Mikzsa and Tan (in press) found that collegiate

musicians' reports of grit were a positive predictor of (a) tendencies to engage in flow while

practicing, (b) self-reports of practice efficiency, and (c) self-efficacy for self-regulation. Flow

refers to a phenomenological state of intense involvement and intrinsic enjoyment that

individuals experience when deeply engaged in a task (Csikszentmihalyi, 1990). Investigations

of flow in music learning contexts are steadily gaining in prevalence with most showing that

intermediate to advanced musicians often experience flow in their practicing and performing

(e.g., Diaz & Silveira, 2013; O'Neill, 1999; Sinnamon, Moran, & O'Connell, 2012). Lastly,

commitment to music instruction is a construct that has been shown to be related to musicians'

motivation orientations in previous research (Asmus & Harrison, 1990; Schmidt; 2005). In

particular, Schmidt (2005) found that reports of mastery goal orientations were positively related

to commitment, whereas no relations were found for performance goal orientations.

Purpose

The purpose of this study was to explore the achievement goal orientations of

instrumental music education students in the US and Singapore. We examined the following

hypotheses: (a) that the 2 X 2 achievement goal model would be a better fit to the data than

alternative dichotomous and trichotomous models, (b) that mean differences would be found

according to culture such that musicians from Singapore would endorse performance and

avoidance goal orientations more strongly than musicians from the US, (c) that among US

participants, mastery motivation orientations would be positively related to measures of grit,

flow, and commitment to band, whereas performance orientations would be negatively or not at

all related to these constructs, and (d) that among Singapore participants mastery and

performance motivation orientations would be positively related to measures of grit, flow, and commitment to band.

Method

Comparative International Contexts

The education and instrumental music education system in Singapore – a city-state in Southeast Asia located off the southern tip of the Malay Peninsula – differs from the United States in several ways. While North American high schools typically house students in grades 9 to 12 (ages 15 to 18), the closest equivalent in Singapore is the upper secondary (US equivalent of grades 9 to 10, ages 15 to 16) and the junior college (US equivalent of grades 11 to 12, ages 17 to 18) or polytechnic (typically ages 17 to 19) (Freer & Tan, 2014). Junior colleges offer two-year programs for students intending to progress to university and polytechnics award professional diplomas. In the United States, band is a curricular subject taught by directors qualified by universities and colleges. In Singapore band is an after-school "co-curricular" activity taught by peripatetic directors who do not necessarily hold college degrees (Lee, 2004).

Participants

Subjects in this study included volunteer band students ($N = 359$) from eight American public high schools ($n = 217$) and five polytechnic schools in Singapore ($n = 142$). The American schools included two in the Northeast, three in the Midwest, two in the Southwest, and one in the Southeast. The American schools vary widely in characteristics including urbanicity, students' socio-economic levels, and the size and staffing of the band programs. All five polytechnics in Singapore are represented in this study. They are located in various parts of the city-state, vary widely in students' socio-economic status, and are roughly similar in terms of the size and staffing of their programs. The American sample consisted of 124 females (57.7%) and 91 males

(42.3%) ranging from 13 to 18 years of age ($M = 15.75$, $SD = 1.23$). Brass (27.0%), woodwind (54.0%), percussion (10.7%), and violin (8.4%) were represented. The mean age they began study on their instrument was 11.07 ($SD = 1.85$). The Singaporean sample included 69 females (48.6%) and 73 males (51.4%), who were on average older than the American sample ($M = 18.37$, $SD = 1.04$, Range 17 to 22). Instruments represented included brass (47.5%), woodwind (39.7%), and percussion (12.7%), and, on average, the Singaporean students began study at a slightly later age ($M = 12.42$; $SD = 1.87$). Lastly, a greater proportion of US participants (44.1%) had private instruction on their instrument than the Singapore participants (17.7%).

Measures

Data were collected through a 43-item Music Learning Questionnaire. The questionnaire included banks of items measuring the constructs achievement goal orientation, flow, grit, and commitment to band, as well as a final section that included items regarding demographics and practice habits. Ensemble directors were supplied with paper copies of the Music Learning Questionnaire, which were distributed in rehearsals. Participants were instructed to complete the questionnaire at home with parental consent and return completed questionnaires to their directors in a sealed envelope. Directors gathered responses over a period of one week and returned materials to the researchers. At a director's request, students at one site were given pre-addressed stamped envelopes to return the questionnaires directly to the researchers.

Achievement goal orientation was measured using the 12-item Revised Achievement Goal Questionnaire (R-AGQ) (Elliot & Murayama, 2008). Participants responded to a series of statements using a five-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree". Each achievement orientation from the 2 X 2 framework (mastery approach, mastery avoidance, performance approach, and performance avoidance) was represented with three statements,

which were averaged to form indexes for each orientation. Internal consistency of the items related to each of the four orientations was acceptable for the American and Singaporean samples ($\alpha = .64$ to $\alpha = .82$).

Experiences of flow during concert band were measured using the Short Dispositional Flow Scale (Jackson, Martin, & Eklund, 2010). The Short Flow Scale consists of nine items aligned with Csikszentmihalyi's (1990) nine dimensions of flow: clear goals, concentration on task at hand, challenge-skill balance, action-awareness merging, sense of control, unambiguous feedback, loss of self-consciousness, autotelic experience, and transformation of time. Students responded to whether, in concert band rehearsals, they experienced each dimension "always, frequently, sometimes, rarely, or never". The dispositional form of this scale has been found to have acceptable construct validity and reliability relative to the longer Flow State Scale 2 (Jackson, Martin, & Eklund, 2008), which was previously validated in music contexts (Wrigley & Emmerson, 2013). The internal consistency of the measures was good ($\alpha = .79$ for total sample; $\alpha = .80$ and $\alpha = .75$ for US and Singaporean samples, respectively).

Tendency to exhibit grit in practice habits was measured with an 8-item scale previously found to be internally consistent when used with instrumentalists (Miksza & Tan, in press). This scale was adapted from Duckworth and Quinn's Short Grit Scale (2009). Students responded to statements such as "I finish whatever practice goal I set" using a 5-point scale ranging from "very much like me" to "not at all like me". The internal consistency of the measure of grit was acceptable ($\alpha = .73$ for total sample; $\alpha = .73$ for US sample; $\alpha = .64$ for Singaporean sample).

The variable commitment to band was measured using six items developed by Schmidt (2005). These items were adapted from Asmus and Harrison's (1990) earlier measure. A 5-point Likert scale was used to rate each statement from "strongly agree" to "strongly disagree".

Internal consistency of the measure was excellent ($\alpha = .92$ for total sample; $\alpha = .93$ for US sample; $\alpha = .92$ for Singaporean sample).

Results

Principal axis factor analyses with oblique (direct oblimin) rotation were conducted using the responses to the 2 X 2 achievement goal items. Assumptions regarding subject-to-variable ratio, Kaiser-Meyer-Olkin sampling adequacy, and Bartlett's Test of Sphericity were satisfied. Eigenvalue criteria (> 1) and scree plots were examined to identify the appropriate number of factors to interpret. Factor solutions for the combined as well as separate US and Singapore data are presented in Tables 1, 2 and 3, respectively. A three-factor solution indicating an aggregate Performance factor and separate Mastery-Approach and Mastery-Avoid factors emerged clearly from each analysis. However, there were differences in item loadings between the independent group analyses such that (a) a performance approach item ("I am striving to do well compared to other students") loaded more strongly on the factor representing primarily mastery approach orientations among the Singapore data and (b) the relative strength of loadings for several of the items on each factor was somewhat different (see Tables 2 and 3). In addition, correlations among the factors resulting from the analysis with the Singapore participants' data ($|r| = .23$ to .36) were somewhat stronger than those with the US participants' data ($|r| = .17$ to .26).

Given the results of the factor analyses, three achievement goal motivation scales were used in the remaining analyses: mastery-approach, mastery-avoid, and a composite performance orientation with no distinction between approach and avoid. Internal consistency estimates for the composite performance scale were good for both groups as well as the combined data set ($\alpha = .77$ to .81). Descriptive statistics for the three goal orientation scales indicated that mastery-approach goals were most strongly endorsed by all three groups (see Table 4).

MANOVA analyses with the three achievement goal sub-scales as the combined dependent variable and participant culture serving as the independent variable revealed a barely significant main effect of cultural context, Wilks Lambda = .97, (5, 355), p = .03, with follow-up univariate ANOVAs indicating that US participants endorsed performance goal orientations more strongly than Singapore participants. However, the magnitude of this effect was extremely small (eta^2 = .02). Additional analyses were run to examine whether differences in age and proportion of students taking private lessons between the samples could be confounding this apparent cultural effect. A MANCOVA was run with the achievement goal scales as the combined dependent variable, participant age as a covariate, culture as a categorical independent variable, and whether the participants had studied privately on their instrument (yes/no) as an additional categorical independent variable. Results of this analysis determined that when including the significant covariate of age, neither cultural context, whether the participants have studied privately on their instrument, nor interactions of these variables were significant effects.

Pearson correlations were computed to examine the relationships among the achievement goal scales and the flow, grit, and commitment to band scales for the US and Singapore participants (see Tables 5 and 6). Given the number of coefficients computed, only correlations significant at the .001 level are reported. For the US sample, small to moderate positive correlations were found between mastery-approach and flow (r = .49), grit (r = .31) and commitment to band (r = .55). Very small positive correlations were also found between mastery-avoid and flow (r = .28) and commitment to band (r = .26). For the Singapore sample, only a small positive correlation was found between mastery-approach and commitment to band (r = .39, p < .001). The correlation coefficients representing the relationship between mastery approach and commitment to band for the US and Singapore samples were compared using a

Fisher *Z* transformation procedure and found to be significantly different in magnitude, $z = 1.94$, $p < .05$. Small positive correlations were also detected among flow, grit, and commitment to band for the US participants ($r = .30$ to .53), whereas a small positive correlation was only found between flow and commitment to band for the Singapore participants ($r = .40$).

Discussion

We hypothesized that the 2 X 2 achievement goal model would be a better fit to the data than alternative dichotomous and trichotomous models. Our exploratory factor analyses suggested this was not the case. Instead, a clear three-factor structure emerged that indicated latent constructs of mastery-approach, mastery-avoid, and performance goal orientations. The differences between the factor solutions for the data from the US and Singapore groups were minor with the most blatant difference being the one performance-approach item that loaded on a different factor across the analyses. However, the emergence of a single, composite dimension representing both performance-approach and performance–avoid items was a surprising finding. Although moderate to strong correlations have been reported between similar approach and avoid constructs among music students (Lacaille et al., 2005; 2007; Miksza, 2009a, 2009b; Smith, 2005), no studies examining the construct validity of the 2 X 2 achievement goal framework with exploratory or confirmatory factor analysis in music (Miksza, 2009b), sports (Wang et al., 2007), or academics (Elliot & Murayama, 2008) have found a three-factor solution such as ours.

Previous research comparing the achievement goal motivation orientations of students from Western individualistic and Asian collectivistic cultures also led us to hypothesize differences between the US and Singapore participants in our sample such that musicians from Singapore would endorse performance and avoidance goal orientations more strongly than

musicians from the US (Heine, et al., 1999; Liu et al., 2009). Our data refuted this hypothesis. When controlling for differences between the samples in age and whether they studied privately on their instrument, no differences in achievement goal scale means were detected.

We hypothesized that mastery goal orientations would be positively related to grit in practicing, flow during band rehearsal, and commitment to band for both sets of participants. Although mastery approach orientations were positively related to commitment to band for both groups, the relationship was significantly stronger among the US participants. In addition, relations between grit, flow, and mastery approach orientations were only found among US participants. Taken together, these findings suggest that goals of self-referential improvement were more intimately connected to the set of motivational outcomes among the US participants. We also hypothesized that performance and mastery-avoid orientations would be positively related to flow, grit, and commitment to band among the Singapore participants, whereas for US participants, performance orientations would be either negatively related or not at all related to the additional constructs. No meaningful correlation was found between performance or mastery-avoid orientations and any of the additional constructs among either set of participants. The lack of differentiated relationships as a function of culture is inconsistent with the previous literature with learners from collectivistic cultures (e.g., Wang et al., 2007; Wang et al., 2008) but is consistent with the lack of differences in factor structure and mean values for the achievement goal constructs discussed above. It appears that the achievement goal dispositions of our two samples were more similar than different.

The nature of learning in ensemble-based instrumental music education may be at the root of these divergent findings as compared to previous research in academics and sports. Students in a band are learning in a highly public manner and are constantly encouraged to

compare their musical performing with others in the band for the sake of performance synchronization and interpretation. In addition, the participants in our sample have elected to participate in instrumental music and are members of programs that do not exert much overt pressure on individuals to perform alone. Although the participants' bands may have very high ensemble achievement ideals, the sense of the personal stakes of participating is likely low. These contextual factors could lead to a conceptual blurring of performance-approach and -avoid dispositions among band students. In contrast, achievement goal theory was generated in the context of academics, a setting in which students may perceive higher stakes for individual public performance given its relative infrequency in typical classroom learning processes. In academic settings, students are also more likely to be working privately towards their learning goals and arguably have much more personal control of when they may be engaging in circumstances (e.g., volunteering, hand-raising) in which they may aim to appear successful in comparison to their peers or avoid appearing unsuccessful. Attempts to replicate our findings with direct comparisons between music students' achievement goal orientations towards academics and music would be helpful.

The findings of the current study are limited in several ways. The sample size is somewhat modest and the Singaporean sample of band members is significantly smaller than the American sample, making the stability of cultural comparisons of factor structure of the achievement goal constructs somewhat tentative. Moreover, contextual differences as well as differences in age and experience levels between the Singaporean and American participants could be contributing to the lack of significant differences in achievement goal means and uniqueness of our findings as compared to the existing literature. Although polytechnics in Singapore are rather close cultural equivalents to US high schools, the greater degree of

academic specialization that students can declare and the co-curricular nature of band in the polytechnic setting could be contributing to our somewhat surprising lack of cross-cultural differences as compared to those found in studies of motivation towards academics.

Further research on this topic could pursue replication and extensions with additional samples to determine whether our findings represent a systematic difference between achievement goal orientations. For example, pursuing comparison groups that are more similar in background characteristics (e.g., age, level of experience, private instruction) would help to rule out potentially extraneous effects that could have confounded our hypotheses of cross-cultural differences. In addition, extensions of this research that include measures of band members' achievement goal dispositions towards academic study alongside measures of dispositions towards musical study may serve to clarify whether the lack of cross-cultural differences found in this study are in some way connected to the nature of music learning in ensemble contexts. Lastly, expanding the sample size and refining the measurement tool such that confirmatory modeling techniques can be applied that allow for more specific and direct hypotheses of group differences and invariant factor structures would be useful.

Determining what motivational dispositions learners bring to their musical studies and how those dispositions may predict learning approaches and outcomes can yield valuable information for teachers and theorists alike. Assessing why learners are motivated to pursue musical competence via ensemble participation and how their reasons may vary as a function of cultural context is also an important research endeavor. The divergent findings of this study imply that the 2 X 2 achievement goal framework in instrumental music contexts may not operate in the same way as it does in academic and sport contexts. Consequently, the results

suggest many interesting avenues for researchers interested in the role that achievement goal

motives play in music learning and in the contextual nature of cultural differences.

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Table 1
Factor analysis of achievement goal items – all participants' data

	Factor 1	Factor 2	Factor 3	h^2
PerfAv2	.74 (.73)	-.13 (.12)	.11 (.29)	.56
PerfAv3	.68 (.69)	-.06 (.16)	.11 (.29)	.49
PerfAv1	.60 (.64)	-.11 (.11)	.26 (.40)	.48
PerfAp2	.57 (.59)	.08 (.25)	-.03 (.13)	.36
PerfAp3	.55 (.59)	.31 (.45)	-.21 (.00)	.47
PerfAp1	.52 (.54)	.12 (.27)	-.07 (.09)	.31
MaAp3	-.06 (.17)	.67 (.67)	.13 (.24)	.47
MaAp1	-.01 (.21)	.64 (.65)	.09 (.21)	.43
MaAp2	.18 (.37)	.62 (.68)	-.02 (.14)	.49
MaAv2	.10 (.31)	-.03 (.15)	.80 (.82)	.69
MaAv3	.21 (.40)	.12 (.29)	.54 (.62)	.46
MaAv1	-.04 (.13)	.17 (.24)	.44 (.46)	.24
% Variance	32.87%	13.66%	12.21%	
Factor 1	1.00			
Factor 2	.31	1.00		
Factor 3	.27	.18	1.00	

Note: Pattern coefficients presented first, Structure coefficients in parentheses

Table 2
Factor analysis of achievement goal items – US participants' data

	Factor 1	Factor 2	Factor 3	h^2
PerfAv2	.74 (.73)	-.10 (.10)	-.08 (-.25)	.56
PerfAv3	.63 (.65)	-.09 (.10)	-.17 (-.31)	.46
PerfAp3	.61 (.62)	.25 (.37)	.19 (.00)	.47
PerfAp2	.55 (.54)	.00 (.13)	.01 (-.12)	.30
PerfAp1	.50 (.52)	.18 (-.29)	.12 (.03)	.31
PerfAv1	.50 (.56)	-.09 (.10)	-.35 (-.45)	.43
MaAp3	-.05 (.17)	.74 (.75)	-.14 (-.23)	.57
MaAp1	-.05 (.04)	.72 (-.51)	-.09 (.16)	.54
MaAp2	.15 (.31)	.60 (.64)	.01 (-.13)	.43
MaAv2	.03 (.24)	-.02 (.14)	-.88 (-.89)	.79
MaAv3	.25 (.42)	.17 (.32)	-.49 (-.58)	.44
MaAv1	-.05 (.10)	.17 (.24)	-.47 (-.49)	.27
% Variance	31.50%	14.83%	12.86%	
Factor 1	1.00			
Factor 2	.26	1.00		
Factor 3	-.24	-.17	1.00	

Note: Pattern coefficients presented first, Structure coefficients in parentheses

Table 3
Factor analysis of achievement goal items – Singapore participants' data

	Factor 1	Factor 2	Factor 3	h^2
PerfAv1	.79 (.77)	-.11 (.19)	.06 (.27)	.60
PerfAv2	.74 (.75)	-.13 (.18)	.19 (.37)	.61
PerfAv3	.69 (.73)	.11 (.36)	.01 (.23)	.58
PerfAp1	.50 (.55)	.11 (.30)	.03 (.21)	.32
PerfAp2	.49 (.60)	.33 (.50)	-.04 (.18)	.45
MaAp2	.11 (.37)	.71 (.75)	.01 (.21)	.58
MaAp3	-.08 (.16)	.57 (.57)	.12 (.23)	.34
PerfAp3	.35 (.48)	.52 (.60)	-.21 (.01)	.48
MaAp1	-.01 (.19)	.49 (.51)	.07 (.19)	.27
MaAv3	.15 (.36)	-.01 (.22)	.73 (.78)	.62
MaAv2	.22 (.40)	-.03 (.20)	.65 (.71)	.55
MaAv1	-.05 (.10)	.17 (.23)	.33 (.36)	.15
% Variance	34.81	13.05	11.39	
Factor 1	1.00			
Factor 2	.36	1.00		
Factor 3	.28	.23	1.00	

Note: Pattern coefficients presented first, Structure coefficients in parentheses

Table 4
Descriptive statistics for psychological scales and practice habits by cultural context

	US			Singapore			Combined		
	M	*SD*	*Sk*	*M*	*SD*	*Sk*	*M*	*SD*	*Sk*
Psychological scales									
Mastery Approach	4.22	.61	-.63	4.17	.53	-.08	4.20	.58	-.45
Mastery Avoid	3.79	.92	-.77	3.71	.78	-.65	3.76	.87	-.72
Performance Composite	4.02	.61	-.48	3.81	.67	-.62	3.94	.64	-.56
Flow	3.90	.54	-.37	3.56	.46	-.28	3.77	.54	-.19
Grit	3.15	.58	.47	3.21	.49	-.02	3.17	.54	.08
Commitment to Band	3.72	.86	-.27	4.00	.73	-.32	3.83	.82	-.34
Practice Habits									
Age began instr. study	11.07	1.85	-.54	12.41	1.88	-.52	11.60	1.97	-.42
Days per week practiced	4.02	10.89	13.97	2.74	.96	1.41	3.51	17.87	17.87
Practice minutes per day	40.61	26.90	1.41	132.25	62.87	-.06	76.95	63.34	1.02
Practice sessions per day	1.25	.74	2.17	1.27	.48	1.57	1.26	.65	2.15

Table 5
Pearson correlations among all scales for US participants

	1	2	3	4	5	6
1. Mastery Approach	1.00	**.30**	**.27**	**.49**	**.31**	**.55**
2. Mastery Avoid		1.00	**.37**	**.28**	.19	**.26**
3. Performance Composite			1.00	.20	.04	.20
4. Flow				1.00	**.41**	**.53**
5. Grit					1.00	**.30**
6. Commitment to Band						1.00

Note: $r > .23$, $p < .001$, indicated with bold print

Table 6
Pearson correlations among all scales for Singapore participants

	1	2	3	4	5	6
1. Mastery Approach	1.00	.29	**.41**	.26	.20	**.39**
2. Mastery Avoid		1.00	**.39**	-.01	.04	.26
3. Performance Composite			1.00	.06	.03	.29
4. Flow				1.00	.28	**.40**
5. Grit					1.00	.20
6. Commitment to Band						1.00

Note: $r > .32$, $p < .001$, indicated with bold print